

WHAT IS CLAIMED IS:

1. A piezoelectric/electrostrictive device made of piezoelectric/electrostrictive film which comprises: a substrate section; and an operation section disposed on the substrate section and constituted of a piezoelectric/electrostrictive film and an electrode film; said device being capable of operating by displacement of the operation section,

10            wherein the operation section comprises the piezoelectric/electrostrictive films and electrode films alternately laminated so that uppermost and lowermost layers form the electrode films,

             wherein the operation and substrate sections are integrated by firing, and

15            wherein the substrate section is constituted of a ceramics containing a titanium element.

2. The piezoelectric/electrostrictive device made of piezoelectric/electrostrictive film according to claim 1, wherein for the substrate section, a content of the titanium element of a projected section projected by the electrode film of the lowermost layer of the operation section is different from that of the titanium element of a non-projected section.

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3. The piezoelectric/electrostrictive device made

of piezoelectric/electrostrictive film according to claim 2, wherein the content of the titanium element of the projected section is larger than that of the titanium element of the non-projected section.

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4. The piezoelectric/electrostrictive device made of piezoelectric/electrostrictive film according to claim 1, wherein the substrate section contains 0.3 to 4% by mass of the titanium element in an equivalent amount of titanium oxide in the projected section projected by the electrode film of the lowermost layer of the operation section.

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5. The piezoelectric/electrostrictive device made of piezoelectric/electrostrictive film according to claim 1, wherein the ceramics constituting the substrate section is zirconium oxide.

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6. The piezoelectric/electrostrictive device made of piezoelectric/electrostrictive film according to claim 1, wherein the substrate section has a thickness of 2 to 10  $\mu\text{m}$ .

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7. The piezoelectric/electrostrictive device made of piezoelectric/electrostrictive film according to claim 1, wherein the electrode film is constituted of a material containing platinum which is a major component.

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8. The piezoelectric/electrostrictive device made

of piezoelectric/electrostrictive film according to claim 1, wherein the electrode film is dense in at least the lowermost layer which contacts the substrate section.

5           9. The piezoelectric/electrostrictive device made of piezoelectric/electrostrictive film according to claim 1, wherein the operation section includes two to four layers of the piezoelectric/electrostrictive films.

10           10. A manufacturing method of a piezoelectric/  
electrostrictive device made of piezoelectric/  
electrostrictive film which comprises: a substrate section;  
and an operation section disposed on the substrate section  
and constituted of a piezoelectric/electrostrictive film and  
15 an electrode film; said device being capable of operating by  
displacement of the operation section, wherein the operation  
section comprises the piezoelectric/electrostrictive films  
and electrode films alternately laminated so that uppermost  
and lowermost layers form the electrode films, wherein the  
20 operation and substrate sections are integrated by firing,  
and wherein the substrate section is constituted of a  
ceramics containing a titanium element, the manufacturing  
method comprising the step of:

25           using a conductor material containing 0.3 to 8% by  
mass of titanium oxide as a material of the electrode film of  
the lowermost layer which contacts the substrate section to  
carry out a heat treatment so that the substrate section

contains the titanium element.

11. The manufacturing method of the piezoelectric/  
electrostrictive device made of piezoelectric/  
5 electrostrictive film according to claim 10, wherein an  
average particle size of titanium oxide contained in the  
material of the electrode film is 0.05 to 0.4  $\mu\text{m}$ .

12. A manufacturing method of a  
10 piezoelectric/electrostrictive device made of  
piezoelectric/electrostrictive film which comprises: a  
substrate section; and an operation section disposed on the  
substrate section and constituted of a piezoelectric/  
electrostrictive film and an electrode film; said device  
15 being capable of operating by displacement of the operation  
section, wherein the operation section comprises the  
piezoelectric/electrostrictive films and electrode films  
alternately laminated so that uppermost and lowermost layers  
form the electrode films, wherein the operation and substrate  
20 sections are integrated by firing, and wherein the substrate  
section is constituted of a ceramics containing a titanium  
element,

wherein the substrate section is constituted of a  
material containing titanium oxide having been prepared  
25 beforehand.